OTH Amberg-Weiden

The Automotive Team offers:

Bachelor or Master Thesis

Reinforcement Learning: Fine-tuning Pretrained Policies with Real-World Data to Mitigate the Sim-to-Real Gap

Summary

The performance of reinforcement learning policies is highly dependent on the input domain. When a model is trained in simulation and then deployed in the real world, a domain shift occurs, leading to degraded performance. This performance loss is known as the *sim-to-real gap*, and the goal of this thesis is to reduce it. To achieve this, a policy pretrained in simulation will be fine-tuned using real-world data.

The specific task of this thesis focuses on the optimal placement of repeater nodes in a tunnel environment for search and rescue operations. A robotic dog explores the tunnel and deploys repeater nodes based on the output of the reinforcement learning policy. The objective is to provide full coverage of the tunnel environment with a robust ad-hoc wireless network established by these repeater nodes.

Your tasks

- Conduct a literature review on fine-tuning reinforcement learning policies online
- Develop and build an AI model to fine-tune a reinforcement learning policy
- Deploy the model on an edge device such as the Jetson AGX Orin
- Test and validate the fine-tuned policy against the baseline

Your profile

- General knowledge of AI topics and model development
- Proficient in Linux, Python, and PyTorch (or another AI framework)
- Prior experience with reinforcement learning is a plus

We offer

- Individual supervision and regular feedback to support your growth in reinforcement learning
- Participation in current research projects
- Freedom to choose the technologies you prefer
- Flexible working hours

Sparked your interest?

Reach out to one of the contacts below:

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